2005 Annual Meeting
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Contributed Oral Session 30: Statistics
Monday, August 8, 1:30 PM - 5:00 PM, Meeting Room 520 B, Level 5, Palais des congrès de Montréal

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Variation partitioning of species data matrices: estimation and comparison of fractions.

Peres-Neto, Pedro[*,1], Legendre, Pierre[2], Dray, Stephane[2], Daniel, Borcard[2], [1] Department of Biology, Regina, Canada[2] Departement de sciences biologiques, Montreal, Quebec, Canada

ABSTRACT- Establishing relationships between species distributions and environmental characteristics is a major approach in the search for forces driving species distributions. Canonical analyses such as redundancy analysis and canonical correspondence analysis are invaluable tools for modeling communities through environmental predictors. They provide the means of conducting direct explanatory analysis in which the association among species can be studied according to their common and unique relationships with the environmental variables and other sets of predictors of interest such as spatial variables. Variation partitioning can be then used to test and determine the likelihood of these sets of predictions in explaining patterns in community structure. Although variation partitioning in canonical analysis is routinely used in ecological analysis, no effort has been reported in the literature to consider appropriate estimators so that comparisons between fractions or eventually between different canonical models are meaningful. We will show that variation partitioning used in canonical analysis as currently applied is biased. We will present appropriate unbiased estimators and outline a statistical test to compare fractions in canonical analysis. This test enables us to assess if environmental relationships are more important than spatial variation in determining species distributions. The test will be shown to have appropriate type I error rates and good power for both redundancy analysis and canonical correspondence analysis.

Key words: community ecology, canonical analysis, variation partitioning, spatial analysis